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ABSTRACT

This module is the third section of a four-part how-to manual for integrating curriculum in grades K-12, especially in Missouri. The module outlines step-by-step procedures for integrated units, integrated years, and integrated schools. Comments from teachers, students, and administrators who are actively involved in integration in Missouri schools are interspersed throughout the module. The schools from which ideas were drawn were selected to represent a broad spectrum of learning environments, from urban to rural, from magnet school to comprehensive K-12. The module is organized in four sections explaining how to implement four types of integration: (1) developing integrated units of study; (2) the integration of elementary schools; (3) integrating academic and vocational education; and (4) integrating the entire school district. The module also includes descriptions of 10 school reform measures, a glossary defining 19 terms, and interspersed lists containing 8 references. (KC)

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A PRACTITIONER'S GUIDE TO INTEGRATION

MODULE 3

Implementation Guide

Instructional Materials Laboratory
University of Missouri/Columbia

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A PRACTITIONER'S GUIDE TO INTEGRATION

Implementation Guide

MODULE 3

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MODULE 3: PREFACE

"A Practitioner's Guide To Integration" is designed to serve as how-to manual for anyone, grades kindergarten through twelfth, who is interested in integrating curriculum. The manual is divided into four separate modules, each of which discusses a common question related to integration. These modules are: Module 1: What is Integration? and Why Integrate? Module 2: Why Integrate? Module 3: How to Integrate - Step-by-Step, and Module 4: How Do We Assess Integration Throughout the District?

Module 1, provides a definition for integrated learning and suggests ways to categorize types of integration. It also examines the benefits of integration for everyone involved and dispels many of the common myths about integration. Module 2 focuses on how integration can occur, with topics ranging from communication to scheduling to various models, career paths and thematic units. This module, Module 3, outlines step-by-step procedures for integrated units, integrated years, and integrated schools. Module 4 discusses the topic of assessment and provides suggestions for assessing students, integrated teaching, and integrated programs.

Each module is intended to stand on its own. Readers should feel free to select one or more of the modules that are particularly pertinent to them. In keeping with the independent nature of the modules, each module concludes with its own resource list of pertinent materials to refer to for additional information.

Case studies and comments from those who are actively involved in integration can be found throughout the modules. They can serve as a rich source of ideas and inspiration and can help readers learn from the experiences of others. Although each case study is located in one of the four modules, each study has much to say about many different topics, not just the topic addressed in that particular module. The schools portrayed in the case studies were selected to represent a broad spectrum of learning environments, from urban to rural, from magnet school to comprehensive kindergarten through twelfth grade.

To understand integration in an actual school setting, we chose a case-study design. Our review of literature told us that integration was an evolving practice with different schools taking different approaches. We selected our sample from schools that educators identified as attempting integration in various degrees. We also used schools that represented different segments of the educational system in Missouri, such as small schools, intercity schools and schools that are integrating through different grade levels. Throughout this document you will visit four case studies

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that outline various methods of providing integrated learning. We found these schools to vary in different degrees and also found some common threads throughout all of the schools.

We found in most cases, changes in pedagogy and curriculum were not the results of mandates, but rather a bottom-up, grass-roots effort by teachers to improve their own classes. Integrated academics were initiated by teachers or administrators who felt frustrated that their students were unprepared for the workplace and unable to make connections between subject matters.

The desire for the teacher to transmit knowledge is deeply rooted. A teacher's collegiate experience is usually dominated with instructional format that emphasizes transmission of knowledge through lecture. Modeling from generation to generation has been the practice in many classrooms.

It's not that educators have been doing a poor job of educating all along. But, our current educational system, which was developed in the early 1900s in response to the industrial revolution and patterned after the assembly line, no longer meets the needs of a technological/ information society competing in a global marketplace. The education system of the 21st century should parallel the "real world" and should implement site-based decision-making, strategy planning and total quality management processes used in industry.

Have previous educational reform methods provided a bandage or the cure to our educational system? Most educators will answer "a bandage." Integrating academics will be successful because it attempts to RESTRUCTURE the delivery of our educational system.

In restructuring, we must remember: the teachers are the foundation of every educational structure. To reinforce the foundation we must provide teachers with new methods, techniques and ideas for teaching. We must reinforce the foundation with quality materials that are useable to teachers. The teachers will polish and shine the materials and present them in a method that the students will grasp and understand.

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Glossary of Terms

1. **Academic performance standards** - consist of selected target knowledge or behaviors which students should be expected to perform prior to successfully completing an educational program.

2. **Authentic assessment** - assessment of student performance based on "real world" experiences or standards found in or associated with the world of work.

3. **Cognitive complexity** - one of the key features of authentic assessment procedures is that they be sensitive to the cognitive complexity of students. Does the assessment procedure capture my student's ability to think or have I only focused on facts. Does the tool provide some indication of their problem-solving ability as well as the processes they use to address problems?

4. **Competency** - is a learned behavior which can be repeated to predetermined standard.

5. **Competency-based education** (CBE) - is a methodology of instruction that (a) identifies the cognitive, psychomotor, and affective skills needed to meet a specific standard; (b) informs students and teachers of the precise and detailed learning objectives required to achieve performance; (c) emphasizes performance standards in testing, course requirements, and/or graduation; and (d) facilitates learning by allowing each student to master the task through flexibility in learning time and methods.

6. **Content quality** - most academic disciplines have developed, or are in the process of developing standards. In vocational areas, there has been a long history of identifying and validating competencies for the various technical service areas. Teachers should ask "Do my assessment tools accurately connect with those standards that have been established for my teaching area?"

7. **Content standards** - spell out the subject-specific knowledge and skills that schools are expected to teach and students are expected to learn. Standards-setters have adopted the shorthand phraseology "what students should know and be able to do."

8. **Criterion-referenced evaluation** - is a procedure that measures student performance or knowledge according to the conditions and standards stated in the performance objective.

9. **Endogenous model** - is viewing education from *within the educational system.*, i.e. Curriculum divided into familiar academic disciplines (math, science, history, music, etc.); intelligence and achievement defined in terms of verbal (reading and writing) and analytical abilities.

10. **Exogenous model** - is focused on the perspective of *what is valued and needed by society*, curriculum organized around the needs of society and the development of specific competencies (integrated topics, workplace issues, societal issues, technical & social problems, etc.) ; intelligence viewed in multiple ways including problem solving, concrete and applied abilities.

11. **Integration or integrated/infused academics** - is a process of forming, blending, coordinating or weaving into a functioning or unified whole. It is the fusion of what were separate or distinct disciplines into one subject area.

12. **Interdisciplinary unit of instruction** - is materials and/or information spanning or crossing one or more disciplines necessary for instructional periods for the teaching/ learning process in order to reach the unit objective.

13. **Performance objective** - is a statement of what the student must do in observable and measurable terms.

14. **Product evaluation** - is the rating of the product of a student's performance: also a summative evaluation.

15. **Process evaluation** - is a measure of a student's ability to perform a given procedure: also a formative evaluation.

16. **Rubrics** - are scoring devices (or tools) which are designed to assist in the process of clarifying and communicating expectations. Rubrics are expectations or grading grids which contain specific information about what is expected of students for every performance standard.

17. **Task analysis** - is the identification of cognitive, psychomotor, and affective skills needed to perform a specific task.

18. **Taxonomy** - is a system of classifying objectives into types or levels. Examples: Bloom's Taxonomy, Snyder Taxonomy.

19. **Unit objective** - is a statement of the intended purpose (overall behavioral outcome) expected of each student after completion of a unit of instruction.

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School Reform Measures

1. Workforce 2000 - a study published in 1987 was the basis for President Bush's education reform in America 2000. The report recommends better skills training and improved service productivity as needed for future job expansion. The report projected a continued shift from manufacturing to service employment.

2. **A Nation At Risk** - A 1983 report by the National Commission on Excellence in Education called for major changes in public schools and criticized America's educational system for producing high school graduates with fewer academic abilities because of too many general track courses, fewer students in higher science and math, and a decreased time spent on homework. The study recommended Vocational Education should demand the same stringency.

3. **The Unfinished Agenda** - A 1984 report by the National Commission on Secondary Vocational Education promoted the integration of academic and vocational education along with emphasizing the intensity in academics for vocational students. The commission recommended bridging the gap between academic and vocational courses.

4. **SCANS** - (Secretary's Commission on Achieving Necessary Skills) Developed by the Department of Labor that concluded: that basic skill competencies "should be taught and understood in an integrated fashion that reflects the workplace contexts in which they are applied."

The commission spent two years studying what people need to know to hold productive and high-paying jobs. The Commission emphasized not a change on what is taught - only how it is taught.

5. **America 2000** - President Bush's national education goals:

   a. All children start school ready to learn

   b. A 90% high school graduation rate

   c. Competency in English, math, science, history and geography

   d. Every adult American will be literate

   e. Every school will be free of drugs and violence

6. **A Nation Prepared** - Carnegie report in 1986 asserted the need to "restructure school to provide a professional environment for teachers, freeing them to decide how best to meet state and local goals for children while holding them accountable for progress."

7. **The Outstanding Schools Act of 1993** - The Outstanding Schools Act of 1993, signed into law by Governor Mel Carnahan on May 27, 1993, after passage with bipartisan support in both houses of the Missouri legislature, dramatically improves public education throughout the state. It increases Missouri's financial investment in education by more than $360 million a year over FY 1993 funding, but more importantly, it sets into motion a series of carefully planned and thoughtfully orchestrated reforms designed to transform Missouri's school system into a model of educational excellence.

8. **Tech-Prep and the Perkins Act** - Tech-prep Education is addressed in two different segments of the Carl D. Perkins Vocational and Applied technology Act of 1990.

Title II, Basic State Grants, Section 235, Uses of Funds: The law identifies a Tech-Prep program as an allowable expenditure providing it meets three requirements:

1. The size, scope and quality to be effective
2. The integration of academic and vocational education through a coherent sequence of courses
3. Equitable participation for special populations

Title III, Special Programs, Part E: Tech-prep education receives major emphasis under Title III and the law emphasizes two purposes:

1. "To provide planning and demonstration grants to consortium of local education agencies and post-secondary educational institution, for the development and operation of 4-year programs designed to provide a Tech-Prep program leading to a 2-year associate degree or a 2-year certificate."
2. "To provide in a systemic manner, strong, comprehensive links between secondary and postsecondary educational institutions."

9. **School-to-Work Opportunities Act** - On May 14, 1994, President Clinton signed the STW Opportunities Act into law. The purpose of the Act was to develop a nationwide school-to-work system to address the serious skills shortage in our Nation's youth entering the workforce. The end result was unprecedented cooperation between the Department of Labor and the Department of Education. The goal is to insure students have a seamless transition from secondary education into meaningful, high-quality employment and/or further education.

10. **A+ Schools Program** - A provision of S.B. 380 is the A+ Schools program. The program is designed to provide high school students in the state of Missouri with an exciting and rigorous program of academic and technical education that leads to community college or workplace skill development. The Outstanding Schools Act establishes the A+ Schools program to provide grant awards to Missouri's public secondary schools that demonstrate a commitment to insure that:

1. All students be graduated from school
2. All students complete a selection of high school studies that is challenging and for which there are identified learning expectations
3. All students proceed from high school graduation to a college or postsecondary vocational or technical school or high-wage job with work-place skills development opportunities.

HOW TO INTEGRATE

Developing Integrated Units of Study

This section describes a set of activities necessary to planning integrated units of study. Although they appear as "steps" in a process, they are really intended as checkpoints along a path. That is, some teachers will find starting with the student product more logical for them; others will find starting with curriculum objectives more logical for them. Where a team of teachers (or even the individual teacher in the case of integration within a single person's discipline/classroom) starts is less important than whether the team considers all of the issues discussed. Below you will find first the list of necessary activities. After the listing, each one will be discussed. Finally, the listing of activities will be presented as a checklist for assessing your integrated project, unit, or activity. At the back of the section is an example of a planning form (filled in with an example unit) that many teachers have found helpful as they tackled integrated unit planning.

A second observation about the activities described below is that planners must think of each step as representing a preliminary rather than as a final decision made. For example, although a team might have decided to have students use a particular software package to do their work, later on when that package becomes unavailable, the team must be willing to go back and readjust their thinking. In other words, planners must be flexible and willing to alter plans both as they plan and as they implement the unit.

Necessary Activities in Developing an Interdisciplinary Unit

- Brainstorm, evaluate, and select a concept, theme, or project
- Identify a reasonably authentic and/or age-appropriate context in which to set this concept
- Preliminarily identify the culminating performance, demonstration, exhibition, etc., toward which the students will work and upon which the students will be assessed.
- Articulate a small number (e.g., three to five) of focus questions that will guide (and set limits upon) the project/unit
- Select a primary "Academic Performance Standard" focus and secondary (i.e., contributing) "Standards"; similarly, select primary

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AND CONTRIBUTING "CONTENT" FOR THE UNIT TO ADDRESS (SOURCES: LOCAL CURRICULUM, STATE CURRICULUM FRAMEWORKS, NATIONAL CONTENT STANDARDS DOCUMENTS IN THE DISCIPLINES)

- CREATE AND SEQUENCE ACTIVITIES (LARGE GROUP, SMALL GROUP, INDIVIDUAL) TO COMMUNICATE CONTENT AND PROCESSES
- IDENTIFY WHAT RESOURCES WILL BE NEEDED, WHICH ARE AVAILABLE, WHICH WILL NEED TO BE ACQUIRED
- IDENTIFY AND/OR CREATE ASSESSMENT TOOLS (OBSERVATION CHECKLISTS, ANSWER KEYS, RUBRICS, ETC.) AND APPROPRIATE EVALUATION CRITERIA FOR USE WITH EACH ACTIVITY AND THE CULMINATING PERFORMANCE.

ACTIVITY-BY-ACTIVITY DISCUSSION

BRAINSTORM, EVALUATE, AND SELECT A CONCEPT, THEME, OR PROJECT

Choosing Themes, Concepts, or Projects

Once a team of teachers has decided that they wish to collaborate on a common unit of material (whether they see themselves working in parallel or as an interdisciplinary team), they have just begun. Now they face the task of deciding what disciplines they wish to integrate, what overriding concept and theme will unify the unit of study, and what role(s) each teacher will have in the plan.

Throughout the professional and popular literature are countless examples of innovative units, courses, and entire academic programs that are designed to cut across disciplinary and departmental boundaries and simultaneously to change our (and our students') focus from the transmission, acquisition, and storage of bits of information to the in-depth exploration of a fewer number of "big ideas." From science programs that integrate the humanities to mathematics units that use modeling to study population growth, teachers across the curriculum and across the grade-levels are exploring ways to integrate their individual disciplines to help students study meaningful subjects, issues, and problems.

In but one example, James Banks (professor of education at the University of Washington and past-president of the National Council for the Social Studies) calls for a seminar approach to social studies in which he proposes that "the issues selected for study be ones that have been of concern to humans in the past, that are of concern today, and that will be important concerns in the future." (Banks, 1991) Although conceived through a social studies lens, Banks

provides the following list as examples of concepts or themes that he thinks satisfies this need for enduring importance:

- THE QUEST FOR FREEDOM
- LEADERSHIP AND SOCIAL CHANGE
- THE DEVELOPMENT, USE, AND CONTROL OF TECHNOLOGY
- IMMIGRATION, MIGRATION, AND POPULATION CHANGE
- PEOPLEHOOD, CULTURAL IDENTITY, AND NATIONALISM
- MAGIC, SCIENCE, AND RELIGION: THE QUEST FOR EXPLANATIONS
- COOPERATION AND CONFLICT IN HUMAN SOCIETIES

For another example, a newly created middle school (grades 6-8) has identified the following six big themes for cycling through their instruction that focus on integrating science, mathematics, and technology.

1. **SYSTEMS AND INTERACTION:** A system can be defined as an interacting group of forces, bodies, or substances or as any collection of things that have some influence on one another and appear to constitute a unified whole. How the systems interact gives vital information about the individual components of the system being studied. Any part of a system can be considered as a system or subsystem, with its own interactions and internal parts. This theme provides the basis for the study of all matter from the simplest level to the most complex forms.

2. **STABILITY (Equilibrium, Conservation, Symmetry):** An analysis of the ways in which systems do not change; a study of the constancy within a system. Stability also relates to the repeatability of results in science and the ability to derive "laws" of physical behavior.

3. **PATTERNS OF CHANGE (Trends, Cycles, Random and Unpredictable changes):** Change through time can be analyzed in connection to its rates and patterns. Knowing different patterns of change provides students with an understanding of natural systems and their underlying mechanisms and can help them predict future actions. There are three general categories of change:

   Trends: Steady, predictable changes

   Cycles: Occurring in a sequence that happens over and over - cyclical

   Unpredictable: Changes that appear to be random or so complicated as to have apparently chaotic results

"Once faculty buys into the idea of integration, a common knowledge base needs to be developed. Teachers should become engaged learners as they seek the answers to common questions by reading articles, attending inservice or workshops, and making site visits. Open dialogue and discussions should be an integral part of the process through which they share information. Upon completion of their study, a rational and implementation plan should be outlined. Student learning, not integration itself, should be the guiding focus."

-Pam Conway, Mill Creek

4. **SCALE AND STRUCTURE:** "Structure" emphasizes the relationship among different structures: defines how matter, a system, or a process fits together; is related to function and scale. "Scale" defines the focus of the relationship; determines the level at which this structure is examined; concerns the range, comparison, and measurement of various magnitudes, such as sizes, speeds, distances, amounts, or lengths of time. Scale and structure provide a means for understanding the underlying framework that gives order to matter.

5. **ENERGY:** A central concept of the physical sciences that pervades the biological and geological sciences as well. Energy is the ability of an object to change itself or its surroundings, the capacity to do work; the ability to put matter into motion. Thematically, energy connects all disciplines. Energy sources are crucial in the interactions among science, technology, and society.

6. **TEMPORAL DEVELOPMENT:** Can be broadly described as change over time; represents the idea that the present arises, or evolves, from the past. Change is a progression of simple alterations over the continuum of time. The entire universe and all of its inhabitants can thus be studied from the viewpoint of historical change. This Theme can be used to understand why things exist as they do today by understanding how they were in the past.

Note: These definitions taken from three sources: Science Interactions, Science Plus and GEMS.

Both Banks' themes and the mathematics-science-technology themes are indeed "big ideas"—so big in fact that they might intimidate those looking for a more modest starting point; they do, however, afford an opportunity to consider a couple of the pitfalls that interdisciplinary planning teams should try to avoid.

Common to most examples of interdisciplinary approaches is the twofold concern that the theme or project be meaningful to students and that it be explicitly connected to the curriculum. Given the realities of time, resources, and district/state-mandated curricula, teachers need to focus their energy on those themes or projects that will directly enhance and support the curriculum rather than those that will require additional work. David Ackerman describes this awareness of curricular importance as "validity within the disciplines":

"Validity within the disciplines requires teachers representing each discipline to verify that the concepts identified are not merely *related* to their subjects but are *important* to them." (Ackerman, 1989)

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We have all experienced the planning session in which someone proposes an idea and then we each in turn brainstorm some way in which our discipline could be adapted to accommodate the idea. The question should usually not be how *can* my discipline contribute to this theme or project, but rather, *should* my discipline contribute to the theme or project. In other words, in planning interdisciplinary projects or units, teachers from each involved discipline should ask whether the proposed theme or project will serve as a vehicle for significant learning that will occur within the curriculum rather than as something added to the curriculum. The point is to create an integrated unit of study that will afford students the opportunity to study a concept in depth, thereby enhancing understanding across all levels of cognition—from recall and recognition to analysis to synthesis, extrapolation, and evaluation.

To help address the first concern that the interdisciplinary proposal be meaningful to students, planners should ask the following kinds of questions (extracted from "Choosing a Theme," *ASCD Curriculum Update*, Nov. 1992):

- WHAT IS SO IMPORTANT ABOUT THIS THEME/PROJECT THAT IT WILL PROMOTE FUTURE LEARNING?
- DOES IT HAVE SUBSTANCE AND APPLICATION?
- ARE RELEVANT MATERIALS READILY AVAILABLE?
- IS IT MEANINGFUL AND AGE-APPROPRIATE?
- DOES IT TIE INTO OTHER UNITS, ENABLING STUDENTS TO MAKE GENERALIZATIONS AND HAVE GREATER UNDERSTANDING?
- IS IT WORTH THE TIME NEEDED TO CREATE AND IMPLEMENT IT?

Assuming that the proposed theme (or a revision of it) survives this first inquiry, teams should also ask these more specifically validity-related questions to evaluate the proposed theme's significance to the current curriculum:

- IS THE THEME EMBEDDED WITHIN THE CURRENT CURRICULUM?
- WILL THE THEME ALLOW EACH MEMBER OF THE TEAM TO TEACH REQUIRED CONTENT? OR WILL THE THEME, HOWEVER INTERESTING IT MIGHT BE, REQUIRE TEAM MEMBERS TO SQUEEZE IT IN AMIDST AN ALREADY OVERLOADED CURRICULUM?

In that interdisciplinary instruction offers enormous potential to "help shape the learner's overall approach to knowledge" (Ackerman, 1989), planners should honestly evaluate the theme's potential not only to involve the disciplines in substantial ways but also to occasion analysis of each disciplines' contribution to study of the theme:

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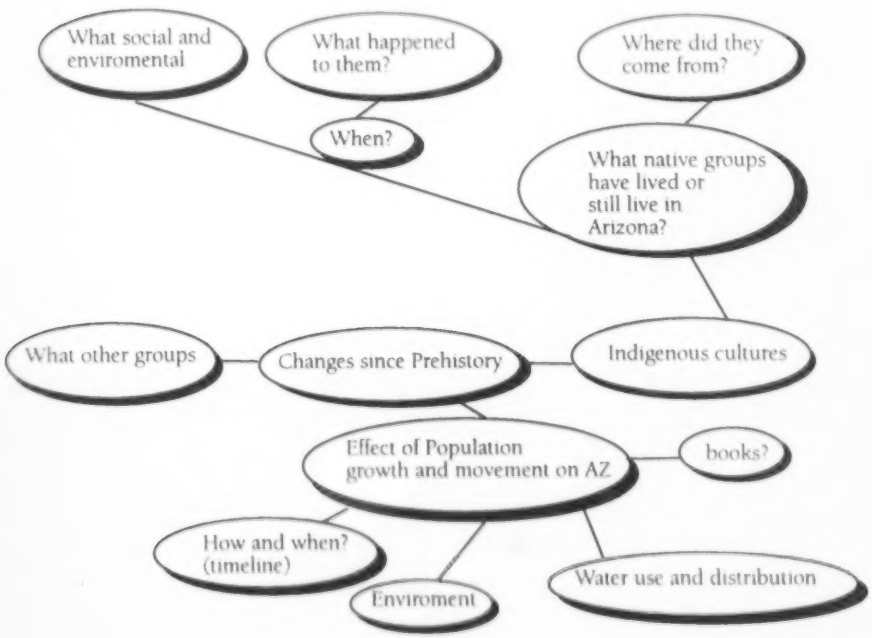
- Does it apply broadly to all areas/disciplines involved?
- Does it reveal fundamental patterns of thinking, problem solving, etc.?
- Does it reveal contrasts and similarities across the involved disciplines?
- As part of the theme planning and evaluation process, planners should take time to articulate in specific terms how the perspective of each represented discipline will legitimately inform study of the proposed concept. Some perspectives will be obvious to the concept; others will require some imagination and creativity. Regardless, however, two points should guide the perspective:
- the perspective should not be forced just to include another discipline in the plan; and
- the perspective should become evident and relevant to the students.

Graphic organizers such as spoked wheels or Venn diagrams are effective ways to visualize the contributions and perspectives of each discipline. The following "web" diagrams show one team's exploration and gradual narrowing of a concept related to desert ecosystems.



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Asimov: "The Against Man"
written report
Language Arts
press conference/ interview
vocabulary
What is the effect of population changes on the environment?
In nature?
In the human community?
Science
Population Growth and and Saturation in Tucson
Demographics
Social Studies
What population changes have occurred?
What trends may we see occurring?
Timelines
How can mathematics be used to accurately predict population growth and saturation?
Math
How can we represent these predictions for easy communication?
Fine Arts
How can we use variables to explore solutions and options?

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IDENTIFY A REASONABLY AUTHENTIC AND/OR AGE-APPROPRIATE CONTEXT IN WHICH TO SET THIS CONCEPT

Contextualizing the Theme: Adding Authenticity (Performance) to the Theme

We began this exploration with a focus on **performance-based** instruction and assessment, and now that we have determined that our proposed theme is appropriate to the students and the curriculum, we should turn our attention to embedding that theme within a context that will enhance its connection to the real worlds of our students.

Scenarios and Contexts: Central to many of the design characteristics of performance-based instructional and assessment materials is the creation of a rich context within which students assume roles, conduct their investigations, and communicate their findings. Context and scenario are interrelated concepts which help define each other. During the development of performance-based activities, developers must carefully consider both elements.

Context refers to the whole situation, background, or environment within which an event, activity, creation, etc., occurs. It is essentially like the setting of a play; examples include such "places" as a newspaper city desk, a trial, a deserted island, an activist meeting. The context determines the motivations, background, stimuli, and interpersonal dynamics of the action.

For example, if the action occurs within a newsroom, the people populating that newsroom will probably be reporting on current and relevant historical events, as well as editorializing about issues. They will probably need to do research, especially interviews, in order to inform their reports and editorials. They will necessarily be involved in writing for the public, creating graphic visual aides, and perhaps drawing cartoons or other visual communications. They are probably interested in the views and interests of their reading public and will weigh their editorial decisions against the reality of their particular audience.

Scenarios work within the context; that is a scenario is the plot played out against the background provided by the context. The author creates the scenario, including specific, logically integrated and sequenced actions leading from a point in time or a specific stimulus to a reasonable conclusion. All steps within a scenario should be appropriate within the context.

Using the newsroom context again, an event or issue (e.g., a proposal to construct a nuclear power plant within the community, an oil spill on the river, an upcoming election, a community-based

historic preservation project, a housing design problem, creating an itinerary for an international tour group, etc.) will trigger a series of activities. These may include a meeting of reporters and/or editors, discussion of the interests/needs of the newspaper's readers, assignment of story topics, determination of lead stories, creation of graphics and cartoons, research for definitions, polls to determine public opinion, interviews to get expert information, perhaps a single story/editorial, perhaps an entire issue. In any case, the beginning is a common stimulus; the ensuing activities are events that would realistically go on within the context; and the entire process leads to a climatic event or activity relevant to the context.

This step should also include decisions regarding how the involved teachers will implement the theme; i.e., will they operate in parallel or will they operate as a multi- or interdisciplinary team?

PRELIMINARILY IDENTIFY THE CULMINATING PERFORMANCE, DEMONSTRATION, EXHIBITION, ETC., TOWARD WHICH THE STUDENTS WILL WORK AND UPON WHICH THE STUDENTS WILL BE ASSESSED

Contextualizing the Theme or Project, Part II: Giving the Students Something Real to Create

Performance-based instruction tends to be goal oriented; that is, students are not only posed with a problem or an issue for study, but they are also directed (and guided) to produce something significant and meaningful as the demonstration of their knowledge and abilities. The following is but a brief list of the wide range of possible climactic events toward which students could be directed, any of which would lead students to apply and demonstrate what they are learning:

- MOCK TRIALS (E.G., PUTTING AN HISTORICAL FIGURE "ON TRIAL")
- JURIES (E.G., ART JURY)
- DEMONSTRATIONS/EXHIBITIONS (E.G., SCIENCE FAIR)
- PERFORMANCES (E.G., A THEATRICAL PERFORMANCE, A PUPPET SHOW, ETC.)
- DEBATES
- PEER INSTRUCTION (E.G., TEACHING STUDENTS IN A YOUNGER AGE GROUP ABOUT HOME SAFETY)
- CITIZEN ACTIONS (E.G., INITIATIVE PETITION, LOBBYING ACTIVITY, ETC.)
- CLASS PUBLICATION(S) (E.G., A CLASSBOOK ON AN HISTORICAL PERIOD OR A SCIENTIFIC DISCOVERY)
- PRESS CONFERENCES/NEWS RELEASES
- PROPOSALS (E.G., FOR SCHOOL EXPENDITURES, FOR A DANCE; FOR CIVIC PROJECTS; ETC.)

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• VARIOUS KINDS OF IMPACT STATEMENTS (E.G., ENVIRONMENTAL, ECONOMIC, ETC.).

Yet another approach to identifying a real-world application of what planners want students to learn can be found in the six Career Paths being implemented in many schools around the country. Within each "Path" are many occupations that can serve to suggest culminating performances (and contexts) for projects. For example, within the "Arts and Communication Path" are such occupations as "interpreter/translator," "technical writer," "musician," "director/producer," "photographer, camera operator," etc. A culminating performance within this path might then involve students in creating a multimedia music performance for an upcoming school dance. Students would need to script the presentation, film (videotape) it, coordinate images and music, etc. Under the "Industrial and Engineering Technology Path" fall such occupations as construction-related trades, engineering, architecture, etc. With this path in mind, students might create three-dimensional models of energy-efficient homes for their climate zone; this is actually an example worked out in this section. *For more information see Career Paths, Section B-10, or contact the Instructional Materials Laboratory (University of Missouri-Columbia, 1-800-669-2465).*

In short, teachers have available countless sources for providing contexts and real-world products that will connect school to the real-world. Whatever planners (or students) ultimately select, it must be a logical outgrowth of the context and scenario. The culmination of such an instructional practice is rarely a test in the traditional sense, and indeed much of what students will produce will not even be "paper-and-pencil." Planners should keep in mind that very little of the student's life will be devoted to taking paper-and-pencil tests; on the other hand, much of the student's life will be spent in writing reports, in constructing three-dimensional (or computer) models, in solving problems and implementing solutions, in arguing cases, etc. Therefore, if one of our goals is to narrow the gap between instruction and the "real world," we must similarly narrow the gap between how we assess student knowledge and ability and how the "real world" will assess them in the future.

ARTICULATE A SMALL NUMBER (E.G., THREE TO FIVE) OF FOCUS QUESTIONS THAT WILL GUIDE (AND SET LIMITS UPON) THE PROJECT/UNIT

One of the often-confronted problems with integrated team planning is the tendency for units to mushroom in size and complexity. Developing focusing questions is very good way for planners to set

boundaries around what they want students to learn from the unit. Our sample lesson/unit on designing an energy-efficient desert home might yield the following guiding questions: "what forms does energy take?" (primarily science and mathematics focus); "how can energy be stored?" (technical and vocational education, in addition to hands-on science and mathematics); "what forms of shelter have various desert cultures used over the years?" (social studies and language arts); etc.

Depending on the degree to which the lesson/unit will be student-directed, these questions could be distributed to students at the outset and used by individuals and/or groups of students to structure and pace their investigation.

The following is another list of themes with a particularly social studies focus. Beneath each of the three themes are a list of questions that planners could use to guide (and set limits) upon their thinking, or that students could use as guides as they work toward their culminating performance. Beneath each question is a short list of skills or knowledge that the student would have to draw upon in answering the question. Although the themes and questions have a particularly social studies focus (albeit a highly integrated one within social studies), they are clearly applicable to other disciplines as well.

I. Time, Place, and Meaning

A. How do we understand people and ourselves in time?

chronology (story—past, present, future); causality; validity of explanation; creative extensions in the arts, literature, mathematics, science, etc.

B. How do we understand people and ourselves in space?

location; place; human-environment interactions; movement; regions; community

C. How do people experience life and try to bring meaning to their lives?

symbols; patterns of behavior; cultural beliefs (assumptions, premises, and world view); tools; communication

D. How do people in different societies and different times and places organize for the production and distribution of goods and services?

needs and wants; scarcity and choice; values; policies

E. How does institutional membership shape people's view of the world as well as their understanding of needs, nature, culture, and change?

needs; institutions; nature; change

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II. Diversity, unity, and world views

A. How should and do people interact with their environment (social and natural systems)?

aesthetics; interaction; causality

B. How do people in different societies and times develop and use various ways of organizing and governing society?

rules; respect; responsibility; justice

C. How do people develop and share beliefs, values, and knowledge (including technology)?

beliefs; tools;

D. How do people develop and use conceptions and misconceptions of "realities"?

perceptionS; viewing and listening skills

III. Interactions and connections

A. How do societies, nations, and cultures interact with one another?

territory; interaction; connections

B. How does an understanding of other peoples help us understand our own conceptions of self and the world?

perceptions; meaning; knowledge.

SELECT A PRIMARY "ACADEMIC PERFORMANCE STANDARD" FOCUS AND SECONDARY (I.E., CONTRIBUTING) "STANDARDS"; SIMILARLY, SELECT PRIMARY AND CONTRIBUTING "CONTENT" FOR THE UNIT TO ADDRESS

Determining Instructional Validity: Grounding the Project/Unit in State, Local, and/or National Curriculum Documents

Many Missouri schools are moving toward implementing the Academic Performance Standards and Curriculum Frameworks. As the Academic Performance Standards are written, they provide a ready means for identifying the kinds of activity in which students might be engaged. For example, one of the standards in Goal 1 (Gathering, analyzing, and applying information) requires students to "Design and conduct field and laboratory investigations." Such a statement could well represent the "objective" for an entire unit or for an activity within a unit. For example, a project/unit might require students to create a marketing campaign for the best kind of coat to keep one warm in Missouri's winter. Using the language of the Academic Performance

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E. How does institutional membership shape people's view of the world as well as their understanding of needs, nature, culture, and change?

needs; institutions; nature; change

CREATE AND SEQUENCE ACTIVITIES (LARGE GROUP, SMALL GROUP, INDIVIDUAL) TO COMMUNICATE CONTENT AND PROCESSES

In adult life, the boss may not provide some framework within which an employee is expected to solve a problem. In school, however, our goals are different; we are trying to teach students **HOW** to solve problems. For this reason, planners should give careful consideration to the kind of scaffolding they provide students (see earlier discussion of scaffolding and modeling). Identifying appropriate activities that will lead students to successful completion of a project and carefully considering the range of cognitive activity required by each activity will usually lead to more complex learning and greater student success. If, for example, most activities call for students to recognize or remember rules, key facts, concepts, definitions, etc., then the unit and the resultant learning cannot be expected to get beyond recall/comprehension. At the other end of the spectrum, if the activities all require students to judge quality or to evaluate worth, the unit is probably overlooking fundamental skills in its zeal to teach higher-order thinking skills of synthesis and evaluation. Three practices will help planners as they sequence activities:

- Frequent reference to cognitive taxonomies, e.g., Bloom, Hannah-Michaelis, etc.; see below for descriptions of cognitive levels; for another approach to identifying areas of activity, see logical process models below),
- Careful (and honest) attention to the verbs used to describe/direct the activities (e.g., recall, apply, analyze, compare, evaluate, etc.) (see below for verbs associated with Bloom's taxonomy, as well as the circle diagram for "Creative Thinking").
- Frequent checks against reality (e.g., scientific method/process) to ensure that the activities students are being asked to perform are realistic and logically necessary to the overall theme.

Planners should also remember to include frequent opportunities for students to examine (and report) what they are learning, how they are solving the problem, etc. Familiar devices, such as learning logs, journals, and of course class discussion, can be appropriate mechanisms for capturing (and later evaluating) this kind of metacognitive information. For additional discussion of this important metacognitive component of learning, see the earlier section on "why we should integrate learning."

Standard, students would be required to come with their own hypothesis to test (e.g., goose down keeps one warmer than cotton-fill); a way of testing the hypothesis; and a way to evaluate the information resulting from their experiments; and finally a way to communicate that information in the marketing campaign. Therefore, the primary "standard" focus might be an assessment of the students ability to "design and conduct a laboratory investigation"; secondary (or contributing) standards (also coming from the Academic Performance Standards) might be the students ability to "organize data in useful forms" (also Goal 1), the ability to "plan and make written, oral, and visual presentations for a variety of purposes and audiences" (from Goal 2, Communicating Effectively), and the ability to "assess the potential costs and consequences of proposed or attempted solutions" (from Goal 3, Solving Problems).

Missouri's Curriculum Frameworks provide another source of information for identifying specific connections to the curriculum. For the above example of creating a marketing campaign for winter coats, students would be exhibiting their understanding of scientific inquiry and the properties of matter and energy (from the Science framework) and their understanding of research and presentation techniques (from the Communication Arts framework). *For more information on using the Academic Performance Standards and State Curriculum Frameworks in planning curriculum and instruction, see various Department of Elementary and Secondary Education publications.* For example, each of the "lessons/assessments" in the DESE "Interpretive Guide to the Academic Performance Standards" (May 1994) contains a list of specific major and contributing standards that the activity is intended to teach/assess. Planners could use this strategy to document (validate and ultimately report) the standards and "content" that the unit is designed to teach.

The point here for integrated study planners is to identify a few specific curriculum points that the unit is expected to teach. Again, the tendency for teachers is to see everything that a unit ***could*** teach. Teachers must resist this tendency and focus on those specific items within their curriculum that the unit ***must*** teach and that students must learn. Ultimately, teachers must be able to document (for themselves, for their students and their parents, for school administrators) what the students are learning. As teachers move toward increasingly integrated units of study, their need for careful documentation of what curriculum has been taught, what needs to be retaught, what does not need to be retaught, etc., becomes increasingly acute. Without this kind of thoughtful accounting of each person's curriculum, the team runs the risk of not knowing where they have been, where they are, and where they need to go next.

Summary of Thinking Skills (ala Bloom's Taxonomy) (extracted from *Measuring Thinking Skills in the Classroom*, rev. ed., Richard Stiggins, et al., 1988, Northwest Regional Educational Laboratory, in cooperation with the NEA Mastery in Learning Project)

Recall/Comprehension: Most tasks require that students recognize or remember key facts, definitions, concepts, rules, and principles. Recall questions require students to repeat verbatim or to paraphrase given information. To recall information, students need most often to rehearse or practice it with other, related concepts. The Bloom taxonomy levels of knowledge and comprehension are subsumed here, since verbatim repetition and translation into the student's own works represent acceptable evidence of learning and understanding.

Analysis: In this operation, students divide a whole into component elements. Generally the part/whole relationships and the cause/effect relationships that characterize knowledge within subject domains are essential components of more complex tasks. The components can be the distinctive characteristics of objects or ideas, or the basic actions of procedures or events. This definition of analysis is the same as that in the Bloom taxonomy.

Comparison/Analysis: These tasks require students to recognize or explain similarities and differences. Simple comparisons require attention to one or a few very obvious attributes or component processes, while complex comparisons require identification of and differentiation among many attributes or component actions. This category relates to some of the skills in the Bloom level of analysis. The separate comparison category emphasizes the distinct information processing required when students go beyond breaking the whole into parts in order to compare similarities and differences.

Application/Synthesis: Both deductive and inductive reasoning fall in this category. In deductive tasks, students are given a generalization and are required to recognize or explain the evidence that relates to it. Applications of rules and "if-then" relationships require inference. In inductive tasks, students are given the evidence or details and are required to come up with the generalization. Hypothesizing, predicting, concluding, and synthesizing all require students to relate and integrate information. Inductive and deductive reasoning relate to the Bloom levels of application and synthesis. Application of a rule is one kind of deductive reasoning; synthesis, putting parts together to form a generalization, occurs in both inductive and deductive reasoning.

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Synthesis/Evaluation: These tasks require students to judge quality, credibility, worth, or practicality. Generally we expect students to use established criteria and explain how these criteria are or are not met. The criteria might be established rules of evidence, logic, or shared values. Bloom's levels of synthesis and evaluation are involved in this category. To evaluate, students must assemble and explain the inter-relationship of evidence and reasons in support of their conclusion (synthesis). Explanation of criteria for reaching a conclusion is unique to evaluative reasoning.

"Cognitive Domain Levels According to Bloom" (extracted and adapted from *Measuring Thinking Skills in the Classroom*, rev. ed., Richard Stiggins, et al., 1988, Northwest Regional Educational Laboratory, in cooperation with the NEA Mastery in Learning Project)

Knowledge: list, describe, define, label, repeat, name, fill in, identify, what, when, who

Comprehension: paraphrase, explain, review, match, discuss, translate, interpret, how, why

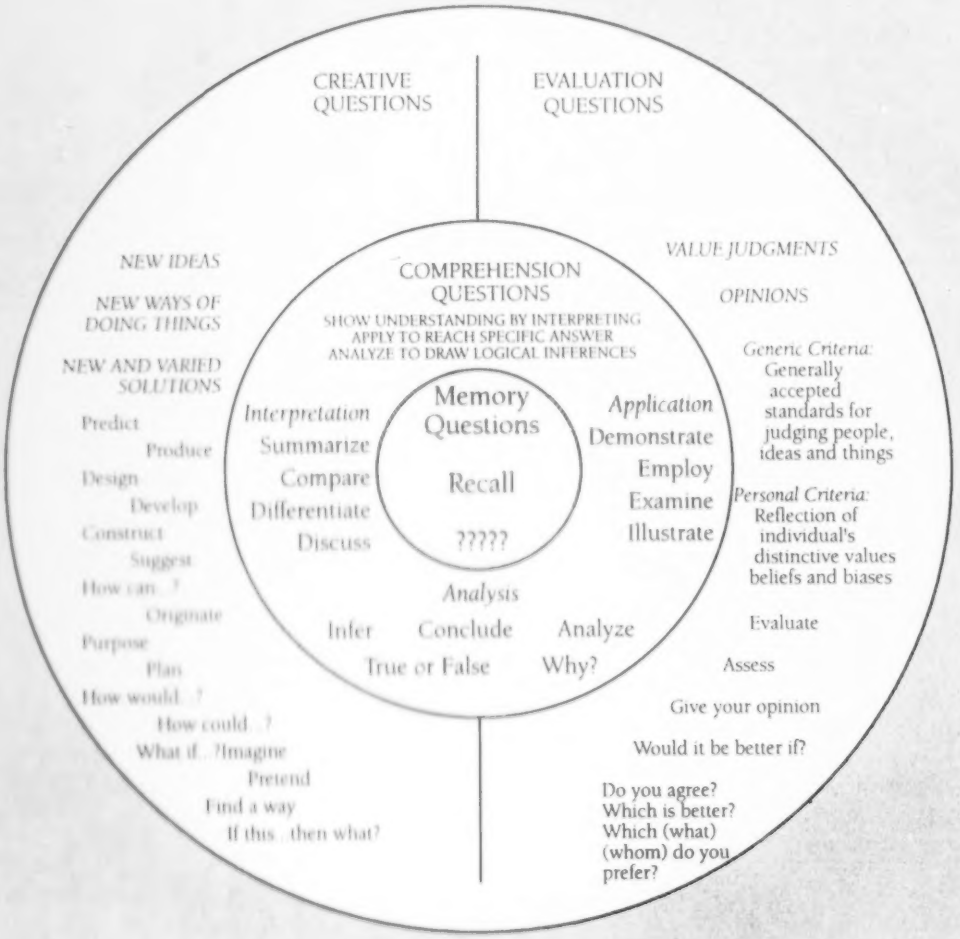
Application: apply, construct, draw, simulate, sketch, employ, restructure, predict, how

Analysis: classify, dissect, distinguish, differentiate, compare, contrast, categorize, separate, break down, subdivide

Synthesis: combine, relate, put together, integrate, assemble, collect

Evaluation: judge, argue, assess, appraise, decide, defend, rate, debate, evaluate, choose, should

CRITICAL THINKING



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Planners might find the following rhetorical tools (excerpted from Robert Marzano's *Dimensions of Learning*, "Activities for Extending and Refining Knowledge," p. 61) useful in envisioning question types or strategies for teaching and assessing both content and processes:

- COMPARING: "IDENTIFYING AND ARTICULATING SIMILARITIES AND DIFFERENCES" (AN APPROPRIATE MEANS OF "DIFFERENTIATING RELEVANT FROM IRRELEVANT INFORMATION")
- CLASSIFYING: "GROUPING THINGS INTO DEFINABLE CATEGORIES ON THE BASIS OF THEIR ATTRIBUTES"
- INDUCING: "INFERRING UNKNOWN GENERALIZATIONS OR PRINCIPLES FROM OBSERVATION OR ANALYSIS"
- DEDUCING: "INFERRING UNSTATED CONSEQUENCES AND CONDITIONS FROM GIVEN PRINCIPLES AND GENERALIZATIONS"
- ANALYZING ERRORS: "IDENTIFYING AND ARTICULATING ERRORS IN YOUR OWN OR OTHER'S THINKING"
- CONSTRUCTING SUPPORT: "CONSTRUCTING A SYSTEM OF SUPPORT OR PROOF FOR AN ASSERTION"
- ABSTRACTING: "IDENTIFYING AND ARTICULATING THE UNDERLYING THEME OR GENERAL PATTERN OF INFORMATION" (ABSTRACTING IS A USEFUL ITEM TYPE IN THAT IT CALLS UPON SEVERAL SUB-SKILLS)
- ANALYZING PERSPECTIVES: "IDENTIFYING AND ARTICULATING PERSONAL PERSPECTIVES AND ISSUES"

Each tool suggests techniques (and frequently potential products) for assessing students' ability to analyze an issue and come to some decision, whether that decision involves developing a personal position on the issue or persuading some audience to believe or act in a particular way.

LOGICAL PROCESS MODELS (Issues Analysis and Problem Solving):

The following models identify steps that most would agree are part of decision making and/or problem solving. Teachers can use these models to help identify and sequence activities that will lead students to successful completion of complex projects.

One warning needs to made, however: Teachers need to be careful not to so structure a unit that students do not need to, or are even prevented from, exercising their own logical powers or their creativity. Consider the following example: Students are posed with

the problem of determining how big a water tower a particular community needs. If the teacher provided data on the number of people living in the community, on the number of gallons a person might typically use in a day, and the number of days for which the tower needed to store water, students would need to do nothing other than discover an equation and plug numbers into the equation. Is this problem solving (as opposed to solving the problem)? Probably not. If the teacher had students discover the data on their own, would the problem represent mathematics problem solving? Maybe, although mostly it would be a research problem and less a mathematical problem. Unfortunately, there is no simple formulae for how much or little to provide your students. Rather, teachers must exercise their knowledge of their students abilities and their professional judgment regarding how much ambiguity their students can tolerate to determine how much (or little) to scaffold the project.

Two Issues Analysis/Decision-Making Models:

Even though this kind of analysis is typically recursive, the following broad steps might be useful for leading students through issue identification/analysis and toward exploration of alternate points of view and subsequent actions:

1. **Information Gathering**
   - A. DETERMINING WHAT IS KNOWN ABOUT THE ISSUE
   - B. DIFFERENTIATING RELEVANT FROM IRRELEVANT INFORMATION
   - C. DETERMINING WHAT ONE NEEDS TO KNOW (RESEARCH AND INFORMATION ACCESSING)
2. **Issue Identification**
   - A. FRAMING THE ISSUE
   - B. DETERMINING A CLEAR UNDERSTANDING OF THE ISSUE
   - C. IDENTIFYING PARAMETERS OF THE ISSUE
   - D. DETERMINING WHO OWNS OR IS AFFECTED BY THE ISSUE
3. **Idea Generation for Possible Points of View (inductive approach)**
4. **Evaluative Criteria Development (deductive approach)**
   - A. DEVELOPING CRITERIA FOR IDENTIFYING AND EVALUATING DIVERGENT POINTS OF VIEW
   - B. PROCEDURES FOR EVALUATING POSSIBLE POINTS OF VIEW AGAINST CRITERIA (E.G. PRO/CON ANALYSIS; COST-BENEFIT ANALYSIS; RISK ANALYSIS; CONSEQUENCES ANALYSIS; IMPLICATIONS ANALYSIS; DIALECTIC)

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5. Communication and/or Action Planning

A. COMMUNICATING OPINION AND/OR RECOMMENDING AN ACTION TO BE TAKEN

B. DEVELOPING AND/OR COMMUNICATING AN ACTION PLAN

Example: A simple example of a decision-making situation might involve students in the following scenario: "You want to buy a good stereo, but you don't know which brand or model will best meet your listening needs and your budget. What do you have to do in order to come to a solution."

1. *Determine your listening needs.* For example, what kind of music do you listen to most often? What parts of the frequency band does this kind of music most require?

- RAP IS HEAVILY DEPENDENT ON THE ABILITY OF THE AMPLIFIER AND THE SPEAKERS TO TRANSMIT VERY LOW FREQUENCIES (BASS)
- ROCK 'N ROLL LEAD GUITAR REQUIRES AN AMPLIFIER AND SPEAKER THAT CAN HANDLE ULTRAHIGH FREQUENCIES AND RETAIN THEIR CLARITY
- TRADITIONAL "SOUL" WITH ITS ORCHESTRATION AND EMPHASIS ON HORNS REQUIRES A SPEAKER WITH STRONG MID-RANGE CAPABILITIES

2. *Determine where (or in what environment) you most often listen to music.* For example, do you want a stereo that is portable so you can take your music wherever you go? Do you listen to music mostly at home where your parents demand that you keep the volume low? Is your listening room full of furniture and thick carpet?

- PORTABLE EQUIPMENT IS NECESSARILY LESS ACOUSTICALLY SENSITIVE THAN STATIONARY EQUIPMENT, BUT THEN AGAIN YOU CAN'T HAUL ONE-HUNDRED POUNDS OF AMPLIFIER AND SPEAKERS TO THE POOL
- IF YOU MUST LISTEN TO MUSIC AT RELATIVELY LOW VOLUMES, YET YOU DEMAND CLEAR SOUND AND VIBRANT SEPARATION, THEN YOU NEED PRETTY SOPHISTICATED EQUIPMENT. GENERALLY, THE LESS SENSITIVE THE EQUIPMENT, THE LOUDER YOU NEED TO PLAY THE MUSIC (THAT IS, YOU NEED TO PUSH MORE POWER THROUGH THE AMPLIFIER TO GET THE MOST OUT OF LESS SENSITIVE SPEAKERS).
- IF YOUR LISTENING ROOM IS FULL OF SOUND ABSORBING FURNITURE AND CARPETING, YOU NEED AN AMPLIFIER AND SPEAKERS THAT CAN OVERCOME THE ABSORPTION. VOLUME IS A FALSE SOLUTION TO A STUFFED ROOM; MAYBE ELEVATING SPEAKERS OFF THE FLOOR (TO DIRECT THOSE DEEP BASS TONES AT YOUR HEAD) WILL SOLVE THE PROBLEM.

These first two points would provide opportunities to assess junior or senior high students understanding of acoustics, involving them in both science and mathematics concepts and processes. Students might be provided a resource packet including articles from sources such as Stereo Review or HiFi Magazine.

3. *What kind of recording media do you listen to most often?*

   • CD, CASSETTE TAPE, RADIO: EACH REQUIRES A DIFFERENT (AND SOMETIMES AN ADDITIONAL) PIECE OF EQUIPMENT. *AS WITH THE PREVIOUS POINTS, AN INVESTIGATION OF RECORDING MEDIA COULD PROVIDE MANY OPPORTUNITIES TO ASSESS STUDENTS' READING, REASONING, AND COMMUNICATION SKILLS.*

4. *How much money do you have to spend?* It is not always the case, but a general rule of thumb is that the more the equipment costs, the better it is. But your listening needs may not require the most expensive equipment. From another angle, if you only have $200 to spend, there is no point in your investigating $1,000 systems. *This step affords opportunity to assess consumer mathematics, opportunity costs, and a host of other economic issues.*

5. *Rank your desires to determine what is most to least important to you.* If, for example, you decide that portability is most important, then there is no point in investigating component systems. If you listen to music mostly in your room, but your parents don't want to hear your rock 'n roll, maybe you should not buy speakers at all; maybe you should invest in good headphones. A decision-making matrix might help you visualize your desires and needs. *This step directly involves the students in social studies processes such as decision matrices.*

6. *Investigate which components and brands best meet your needs; in other words, match what is available to your decision-making matrix.* This step could, for example, take the students into the retail (and wholesale) sector to investigate what products are available at what costs, etc.

7. *Make your decision and act upon it.* The culmination of the task could be the selection of a system and an analysis of the acoustic, economic, social, etc., impacts of the student's decision.

An Alternate Approach to Issues Analysis

The following six-step procedure might be useful for framing the analysis of an issue, an historical event, or some societal action (e.g., a court decision).

1. Defining

This first step would involve students in exploring such issues as how, where, and/or why the issue, *et al.*, originated, who was involved, what are the facts surrounding the issue/event/etc., what is at stake.

2 and 3. Determining Concerns and Obtaining Predicted Consequences

The next steps would call upon students to explore the concerns they or others have or are (were, in the case of historical investigation) likely to have, the actual or potential consequences of the event, etc., and how they or others are likely to respond to the situation.

4. Prioritizing

This step involves students in ranking (comparing, contrasting, etc.) the important sub-issues, elements, etc., of the issue, in identifying levels of causality (necessary, contributory, sufficient) and in distinguishing causality from coincidence.

5. Assessing Sources of Information

At this point, students need to examine the truth and validity of their sources (both their own knowledge and that which they have derived from outside sources). They need to question the depth of their information and to explore areas for which they need additional information.

6. Making a Decision

With an in-depth understanding of the issues and consequences of actions, students would be prepared to make, articulate, evaluate, and support a decision.

Example: An interesting application of these six steps would be an exploration of an historical issue (presumably something from Missouri history) that has contemporary impact, e.g., civil rights, or the creation of the water-use compacts among Missouri River states. The unit would then lead students through an examination of primary and secondary historical artifacts to plumb their understanding of the issue or event. Depending on the event selected, students could be called upon to exercise mathematical content and processes in, for example, the context of an economic analysis (e.g., use of the Missouri

River for transportation of goods), or science in the context of understanding the scientific background of the event, e.g., the nature of mid-continent aquifers and their depletion. A task could then have the students apply what they had learned about the historical event to a contemporary setting; recent court decisions, such as the Hazelwood High School journalism case, could provide particularly fertile ground. If, for example, the historical event involved the creation of a water-use compact between Arizona and Colorado, the students could apply those laws to contemporary ecological considerations concerning dams, "the greening of the desert," etc. In short, any contemporary controversy that has historical roots could be analyzed in light of how another generation worked through the situation.

A Problem-Solving Model:

Like decision-making, problem solving is typically a recursive process. The following broad steps might be useful for leading students through problem identification/analysis and toward exploration of solutions and subsequent actions:

1. **Information Gathering**
   - A. DETERMINING WHAT IS KNOWN ABOUT THE SITUATION
   - B. DIFFERENTIATING RELEVANT FROM IRRELEVANT INFORMATION
   - C. DETERMINING WHAT ONE NEEDS TO KNOW (RESEARCH AND INFORMATION ACCESSING)

2. **Problem Identification**
   - A. FRAMING THE PROBLEM
   - B. DETERMINING A CLEAR UNDERSTANDING OF THE PROBLEM
   - C. IDENTIFYING PARAMETERS OF THE PROBLEM
   - D. DETERMINING WHO OWNS THE PROBLEM

note: steps 3 and 4 are two sides of the same coin

3. **Idea Generation for Possible Resolutions (inductive approach)**

4. **Evaluative Criteria Development (deductive approach)**
   - A. DEVELOPING CRITERIA FOR NOMINATING AND EVALUATING SOLUTIONS
   - B. PROCEDURES FOR EVALUATING POSSIBLE SOLUTIONS AGAINST CRITERIA (E.G. PRO/CON ANALYSIS; COST-BENEFIT ANALYSIS; RISK ANALYSIS; CONSEQUENCES ANALYSIS; IMPLICATIONS ANALYSIS)

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5. **Communication and/or Action Planning**

   A. COMMUNICATING RECOMMENDATION/SOLUTION

   B. DEVELOPING AND/OR COMMUNICATING AN ACTION PLAN

Using the above outline of problem-solving steps, planners might consider a content-based approach to leading students through the process of building a knowledge base from which they can explore solutions. Students might be provided with a common resource packet (e.g., readings, graphical presentations, situations, etc.) selected around a unifying theme; then planners could use the content within their curricula to structure the students' exploration of what they know and are able to do.

Important Reminders:

- DESPITE THE TEMPTATION, PLANNERS SHOULD TRY TO AVOID SUBJECT-BY-SUBJECT QUESTIONING (I.E., POSING SEVERAL MATHEMATICS QUESTIONS, THEN SHIFTING TO SCIENCE, THEN SHIFTING TO SOCIAL STUDIES, ETC.) RATHER, TO THE EXTENT POSSIBLE, ACTIVITIES AND QUESTIONS SHOULD BE POSED IN AS "NATURAL" AN ORDER AS POSSIBLE EVEN THOUGH THAT MAY REQUIRE MOVING BACK AND FORTH BETWEEN AND AMONG CONTENT AREAS. PART OF WHAT STUDENTS ARE EXPECTED TO LEARN FROM INTEGRATED PROBLEM SOLVING IS THE INTERRELATEDNESS OF KNOWLEDGE. WHEN PLANNERS CLUSTER THEIR OWN CURRICULA, THEY REMOVE THE STUDENT'S EXPERIENCE OF FIGURING OUT HOW MATHEMATICS, FOR EXAMPLE, RELATES TO SCIENCE OR SOCIAL STUDIES.
- PLANNERS SHOULD KEEP IN MIND THAT A SINGLE QUESTION MIGHT VERY WELL YIELD INFORMATION ABOUT MORE THAN ONE STANDARD AND CONTENT AREA. FOR EXAMPLE, A SINGLE ACTIVITY MIGHT HAVE STUDENTS EVALUATE DATA PRESENTED IN TWO TABLES AND THEN TO PRESENT THEIR EVALUATION IN A SHORT PARAGRAPH. THE STUDENT'S RESPONSE COULD THEN YIELD INFORMATION FOR MATHEMATICS SKILLS INVOLVING COMPUTATION SKILLS, DATA COMPARISON SKILLS, AND ARTICULATION SKILLS, AS WELL AS WRITING AND LANGUAGE USE SKILLS.
- THROUGHOUT THE PROJECT OR UNIT, STUDENTS SHOULD BE GIVEN OPPORTUNITIES TO REFLECT ON THEIR RESPONSES AND THE CHOICES THEY ARE BEING ASKED TO MAKE.

Consider the following example:

An interdisciplinary unit might involve students in exploring the variety of accidents and emergencies that occur within the home. The final communication might be a home safety program (e.g., book, presentation, etc.) divided into sections representing different locations within the home or accident type categories (e.g., kitchen accidents,

fire safety, etc.). By the end of the unit, individual students might each create a chapter for a home-safety manual or prepare sections of an educational program for presentation to younger students.

1. Gathering Information

- Students could be involved in a broad range of research activities designed to help them explore the subject. Alternatively, students could be provided with a resource packet at the beginning of the unit that might include newspaper or magazine clippings of typical or frequent accidents within the home, graphical material or other representations portraying the problem (e.g., who is involved, what kind of accidents are involved, how often people are involved), etc.
- Using the above problem-solving model, students would then be lead through a sequence of activities and questions that would help them discover what they know about home safety. An activity might include a class discussion of what kinds of accidents occur in the home, intended to help students discover what they already know, where they might find information, what kind of information they would need to help them understand the scope of the problem, etc.
- Content-based activities and questions would then engage the students in their research and/or resource packet as well as additional exploration of their own knowledge. For example, the sub-tasks within "information gathering" suggest that students need to determine what is known and to differentiate relevant from irrelevant (or accurate from inaccurate) information. Selections from the resource packet would give the opportunity to assess reading skills, for example, involved with distinguishing facts from opinions and inferences, comparing, etc.; graphs and tables in the packet would give rise to such mathematics-statistics issues as data comparison and analysis. Additional reading and mathematics issues might involve the students in deriving and interpreting data from newspaper articles and assembling the data in tables and graphs, thereby affording opportunity to assess their computation, graphical presentation, and interpretation skills. When coupled with self-analysis or reflection questions, content-based questions afford the opportunity to assess content-area-specific processes as well.

Hypothetical situations could provide opportunities to explore a variety of science outcomes. For example, a situation might ask students to imagine that while working on a car, they tipped over the car's battery and that its contents spilled out. They could then be asked to hypothesize what common household product would help them deal with the accident and to explain why they chose that

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product. If the student suggested that baking soda would be an appropriate solution to the problem because baking soda is a base and as such it would help neutralize the acid spilled from the battery, one would have an indication of the student's understanding of chemistry-related concepts. A follow-up hypothetical might then ask the student to evaluate what effect baking soda would have on a grease fire. If the student said that baking soda would put out the grease fire because it would neutralize (as opposed to smother) the fire, one would have an indication that the student had inaccurately generalized knowledge. *For additional discussion of helping students identify and correct misconceptions, see the earlier section on why we should integrate.*

2-4. Identifying the Problem, and Generating and Evaluating Possible Solutions

• FOLLOWING THE PROBLEM-SOLVING MODEL, STUDENTS WOULD BE LEAD TOWARD ARTICULATING A STATEMENT (DEFINITION) OF THE PROBLEM (STEP 2), YIELDING, FOR EXAMPLE, A SCOREABLE, PARAGRAPH-LENGTH RESPONSE. DEPENDING ON THE NATURE OF THE INFORMATION REVEALED IN THE RESOURCE PACKET, THEY MIGHT CONCLUDE THAT THE POPULATION MOST AT RISK IS SMALL CHILDREN AND THAT WHATEVER SOLUTIONS (OR APPROACHES, THINKING OF THE HOME-SAFETY MANUAL) THEY LATER DERIVE MUST ADDRESS THE PARTICULAR NEEDS OF AND DANGERS CONFRONTED BY CHILDREN. IN OTHER WORDS, SUCH A DETERMINATION WOULD REQUIRE THE STUDENTS TO ANALYZE HOW BEST TO PRESENT THEIR HOME SAFETY INFORMATION TO CHILDREN, THEREBY INVOLVING THEM IN THE KINDS OF ACTIVITIES DESCRIBED IN STEPS 3 AND 4 OF THE MODEL (POSSIBLE SOLUTIONS AND EVALUATIVE CRITERIA DEVELOPMENT).

In small groups, students might decide that they need additional information on the kinds of accidents most common among small children. One student in a small group might decide to interview a "911" dispatcher about the kinds of accidents reported to "911" and the problems children have in reporting accidents. Another student might decide to compare home first-aid kits to determine if one is commercially available that would meet the needs of children. Each student could then produce a short report (a form which could be scored) in preparation for the next meeting of the small group.

5. Communicating Solution(s) and/or Action Plan(s)

• After comparing their individual findings within the small group, individuals would then each create a chapter that would contribute to the whole manual or presentation. The student who interviewed the "911" dispatcher might prepare a chapter

on what a child should do to report an accident. Since the group had already determined that its audience was children, the chapter would probably require pictures and text accessible to children.

Another strategy (and scoreable product) might involve designing an educational program for children that would teach them about home safety. Rather than a chapter, each student might create an outline and accompanying posters, for example, that could be used in a presentation to be made to elementary school children; alternatively, a group of students might script, direct, and perform a puppet show for young children on home safety. Planners should probably think of this closing (or synthesizing) activity from the perspective of all relevant content areas. That is, through successive scorings (i.e., the teacher from each discipline would score the same response based on discipline-specific criteria), the individual's response would yield information in each content area.

Problem-solving steps 1 and 2 are particularly well suited to teaching and assessing content as the vehicle for building a knowledge base. Steps 3 and 4 ask the student to generalize and hypothesize alternate solutions and evaluative criteria from specific content. Planners might see these latter steps as "pre-writing" activities in which the students are asked to brainstorm (probably an unscored item) and categorize (possibly a scored item) solutions and criteria based on and drawn from the previous content-based activities. As a result of steps 3 and 4, students might be expected to communicate a preliminary solution through a comparative analysis of the alternative solutions evaluated against their criteria.

IDENTIFY WHAT RESOURCES WILL BE NEEDED, WHICH ARE AVAILABLE, WHICH WILL NEED TO BE ACQUIRED

Planners should remember to enlist the assistance of their building's library and media specialist(s) as they are planning activities and identifying resources. When the unit calls for research activities, planners should remember to alert (and cooperate with) library/media center staff to best facilitate these activities. In addition to the practical matters of identifying and coordinating resources and services, planners should be alert to a broad range of research activities that support information literacy. Similarly, planners should think carefully about the "equipment" needs for other areas of a project; for example, if the project/unit will require students to conduct a multi-day science experiment (say, for example, something involving growth in plants), the science "department" will need to be able to support the equipment and storage needs of potentially large numbers of student experiments.

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Obviously, school budgetary constraints are also a factor in determining how large or small a unit must be within a particular school's setting. On the other hand, "experiments" sometimes do not require terribly expensive items. Sometimes common hardware store materials can be used to simulate rather complex concepts. For example, something as simple as string, a few washers, a ruler, and a piece of graph paper can involve students in actively constructing their own understanding of physics of pendulums.

The important thing is for planners to be realistic about what a project will require, while not succumbing to the trap of not doing something because the most-expensive technology might not be available within the school.

IDENTIFY AND/OR CREATE ASSESSMENT TOOLS (OBSERVATION CHECKLISTS, ANSWER KEYS, RUBRICS, ETC.) AND APPROPRIATE EVALUATION CRITERIA FOR USE WITH EACH ACTIVITY AND THE CULMINATING PERFORMANCE

Planners need to remember the distinction between testing and assessment. Although the culminating performance of the unit might be considered analogous to an end-of-unit test (albeit a performance-based test), each step (or activity) needs to be assessed (evaluated) along the way. If the performance is being used as the organizing principle of the unit, its steps might serve as appropriate points of assessment. For example, if the culminating demonstration were a class book, relatively formal assessment might occur at the research stage, at the topic narrowing stage, at the drafting and revision stage, and finally at the final product stage. Along the way, teachers could implement behavior checklists to assess group interaction, self-monitoring, etc.

Planners should also incorporate assessment strategies that enlist (and empower) students in the evaluation process. At the least, students (at all grade levels) should be provided the criteria by which they will be evaluated throughout the project or unit. Better yet, students can be beneficially involved in the creation (or articulation) of those criteria.

Just as we use a variety of tools and methods in reaching students of different skill levels and interests, teachers will need a variety of flexible tools to score (grade) increasingly open-ended and integrated assignments. Recognizing the variability of the ways students are likely to respond to situations, questions, and prompts, teachers must design and implement an evaluation system that is efficient, reliable, and reproducible.

As with other parts of the project's or unit's design, planners must first determine what is significant in the performance; that is, they must establish the criteria by which they will evaluate the students' demonstrations. After determining what is valued, it is a fairly simple matter to identify the most efficient tool for conducting the evaluation. The old saying that one should use the simplest tool available is certainly true here. Some feel that every demonstration requires an elaborate rubric; others feel that everything can be handled by a checklist. Neither is true in every instance. If, for example, the primary or single interest (or point of evaluation) involves the student's ability to organize a body of information for presentation, then all one needs to evaluate in the demonstration is that one trait (see glossary for definition of primary trait scoring). If, on the another hand, the point of the evaluation is to determine the student's ability to communicate a personally meaningful message in whatever medium the student chooses with secondary interests in the student's ability to draw upon a variety of resource materials, then a more holistic approach is called for. The point is that the person or group doing the evaluating must first determine what he or she is looking for in the students' demonstrations. Once the interest(s) are determined, the evaluator then turns to identifying (or creating) the most efficient, fair, and reliable tool for measuring student success.

For considerably more information on assessing integrating learning, see later "Assessment" section.

CRITERIA FOR EVALUATING INTEGRATED PROJECTS/ UNITS:

The preceding pages have 1) identified a set of necessary activities in planning an integrated project or unit of study and 2) discussed each in considerable detail. This final section turns those points of discussion into something of a rubric for assessing the effectiveness of the planning.

Above all, the project or unit must engage the student in actively constructing meaning about important subject matter. Learning can and should be fun, but fun without learning that is a direct outgrowth of the curriculum is merely a fun activity.

1. **The project/unit/activity is based in a major Academic Performance Standard and Framework strand (and/or local curricular objective(s)), and is supported by several related Standards and secondary strands (i.e., it is integrated within and across the disciplines).**

Ultimately unit planners must articulate these skills and connect individual activities to the skills being taught/assessed (i.e., to establish validity or, at the least, congruence). This is not merely a concession to psychometric testing practices; rather, if a goal of the instruction is to diagnosis what students know and are able to do and if a goal of assessment is to evaluate programs and curricula, then activities/questions must be clearly connected to what they are intended to teach. Without an established connection prior to implementation of the unit, the unit runs the risk of becoming a dog 'n pony show designed more to entertain the student than to teach the student a particular set of content and processes/procedures.

2. **The project/unit/activity is based in a realistic scenario/context which is optimally relevant to the students' knowledge and experience (i.e., it is authentic to the real world and to the students' experience).**

   Although one can effectively design a project/unit/activity based in the fantastic, it should still be presented within a plausible scenario/context. Moreover, the project/unit/activity should be as much as possible grounded in the students' experience (i.e., culture), although extending the students' knowledge and experience base is a goal of all instruction.

3. **The activity is appropriate not only to the age/development of the student, but it is also appropriate to what the student needs to learn.**

   That is, if what the student needs to learn is a fairly closed-ended concept (like understanding the concept of volume), then the question posed to the student should reflect the nature of the concept. Consider again the following question, "Your town has outgrown its water tower's capacity. Using the data provided about your town's size and the average amount of water required for each citizen per day, determine how much water your town would need per month." This is indeed a fairly closed-ended situation. Only one path will really lead the student to the single "correct" answer. Certainly, one could score the student for his/her process (method), but there is really only one method and one correct answer.

Alternatively, if the task is more open-ended (recall, for example, the stereo-purchasing decision described above), then it should allow the student multiple entrance points (i.e., the student should be allowed to find his/her own path to solving the problem) and possibly exit points (i.e., a truly open-ended task—something that is very difficult to construct—will allow for genuinely different solutions to the problem, any of which could be equally valid and correct.)

4. **The project/unit/activity should activate or access what students already know (i.e., prior knowledge) and should anticipate those points in a process or in a concept where students frequently get confused (i.e., cognitive bottlenecks).**

   In other words, the activity should recognize that students will bring knowledge to a problem (such as, from whence do plants derive food); however, their knowledge may be incorrect. Therefore, by creating a situation in which the student must challenge prior knowledge, the activity should help the student discover where his/her knowledge is incorrect and needs correcting. Think for example of the question about where plants get food. In what activity(ies) could the students engage that would correct a common misconception that plants derive food from the soil? What do the students already know about plants that would lead them to conclude that plants do actually derive food from the soil? What situation could create the cognitive dissonance necessary for them to seek a different answer to the question?

5. **The activity should be sufficiently scaffolded to assure that students are not unnecessarily frustrated, but open enough so as not to walk the student through a predetermined set of sets that do not acknowledge the student's creativity or challenge the student's understanding.**

   Here is where cognitive taxonomies and/or the logical process models above will help planners structure (or scaffold) a project/unit/activity without necessarily preventing the students from genuinely testing their knowledge or applying their own creativity.

6. **The project/unit/activity should offer the student a variety of ways to reinforce, demonstrate, and/or communicate his/her skills.**

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This criterion acknowledges that students exhibit (or articulate) preferences in how they demonstrate and communicate what they know. For many years, we have been told that students have difficulty with writing and writing is certainly an important communication skill, but it is by no means the only way that we are expected to communicate what we know or what we want done. Therefore, the emphasis here is on a broader notion of communication, one that should include speaking, drawing, constructing, acting, etc, in addition to writing.

7. **The project/unit/activity should engage students in a full range of cognitive activity (e.g., recall — analysis — synthesis — extrapolation/prediction).**

   Here again, frequent references to cognitive taxonomies will help planners think logically through what students would need to be successful at a project or within a unit.

8. **The project/unit/activity should require students to analyze their solutions to a problem and to articulate their thought processes.**

   If one of the goals of education is to learn what works as well as what doesn't work, students must be taught how to think their way through a problem. Similarly, if a goal of education is to empower students to become their own best evaluators, then, again, we must teach them how to self-assess. With these goals in mind, the project/unit/activity should provide students with frequent opportunities to assess their own and others' work.

9. **If the project/unit/activity puts students into collaborative groups, planners might consider jig-sawing the activity such that each student within a group is responsible for a specific piece of the solution. A final step would then ask the group to assemble and assess their individual pieces.**

10. **The project/unit/activity should lead to one or more creative/communicative product(s). Alternatively, the activity might lead to a part of a larger product required by the unit within which the activity resides. For example, if the larger unit required the students to create an environmental impact statement, the product for one activity might be a proposal to conduct research.**

This last criterion requires us to provide the student an opportunity to put it all together, to extend his/her knowledge (both new-found as a result of the unit, and old from other instruction and life experience). In short, this is the teacher's opportunity to assess the students' higher-level thinking skills and the students' opportunity to demonstrate those skills. This (or these) culminating (higher-level) activities/questions must clearly articulate what they are intending to teach (assess), i.e., they must clearly establish (both for the teacher/scorer and the student) the criteria by which the response will be evaluated. Ideally, the students will participate in the process of identifying those criteria. Establishing these criteria at the outset provides the substance for the rubric(s) that will be used to evaluate the responses.

A PLANNING FORM FOR CAPTURING THE TEAM'S IDEAS:

The following four-column form represents the beginning of a planning and record-keeping form for use by planning teams. The contents of this example display a group of teachers' planning on a unit immigration, migration, and population change.

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Concept: Immigration, migration, and population change

Unifying Theme or Project: population growth patterns and resource saturation

Lesson/Unit Planning Sheet			
outcome/objective	*activity*	*resources needed/available*	*means of assessing*
reads informative reports (LA); writes summaries (LA); uses library (LA); social studies outcomes relating to indigenous peoples and population/resource use; art outcomes	create a multi-media, graphic timeline to portray historical perspective of populations in the Tucson area; read informative materials and write summaries	library, paper, markers, photocopier, art supplies, magazines for collage, possible readings: "The Case Against Man" (Asimov, I.)	rubric for holistic scoring of timeline & language activities; observational checklists for group interactions & research skills
relies on data (SCI); organizes ideas differently (SCI); represents phenomena (SCI); collects & organizes data (SCI); ecological dominance (SCI); patterns & relations (MT); scaling (MT)	create maps showing population movements, demographics, resource use	paper, pencil, scales, library	templates, rubric
rate & patterns of change (SCI); models (SCI); data analysis (MT); analytic reasoning (MT); SS having to do with people & resources; econ.	research needs, trends, costs, etc., for resources (e.g., food, water, etc.); determine what is needed	library, guest speaker and/or research (resource) packet	checklist
models (SCI); number (MT); patterns (MT); data analysis (MT); analytical reasoning (MT)	determine (& explain) saturation point at present levels of use	library, calculators, graph paper	answer key, rubric

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understands technological solutions (SCI); rates & patterns of change (SCI); models (SCI); predictions (SCI); new technology (SCI); draws conclusions (SCI); algebra (MT)	manipulate levels (variables) given different growth and/or use scenarios to predict land/resource saturation points	calculators, graph paper	rubric, checklist
use imagination & creativity to solve problems (SCI); solve problems (SCI); makes decisions (SCI); writing process (LA); writes report (LA)	write report to Tucson planning commission on policy impact	word processors, library, graph paper (and/or presentation graphics programs), models, outlines	rubric, checklist
makes/listens to oral report; participates in/listens to discussion/interview (LA); use of technology	school-wide "press" conference (or "expert" panel discussion) on growth patterns and predicted saturation points for the Tucson community	word processors, library, graph paper (and/or presentation graphics programs), models, outlines	rubric, checklist

Reprinted with permission by citation. Foster, B. F., and Walker, M. L. (1993). "Planning and Implementing Interdisciplinary Units: A Workshop." Columbia, MO: Educational Development Project.

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Just as there are different ways to integrated learning, there are different methods to developing an integrated unit of instruction and/or integrated lesson. In establishing the fact that no two schools are alike, no one integration plan will work for all schools. Therefore, we have outlined a number of different processes that might be helpful for you and your team as you begin to develop an integrated unit of instruction. In developing your unit, consider the needs of the local school, students, and community and build around those needs.

The Integration of Elementary Schools

A Four-Part Recipe for Curriculum Integration

Part I Establish Objectives
- Use a year-long planner to guide instruction
- Begin parallel integration
- Begin curriculum integration
- Begin curriculum merging
- Develop a multi-disciplinary or interdisciplinary unit
- Parent Communication (*)

Part II Design additional integrated units
- Investigate and implement alternative assessment plans
- Begin work on self- and peer-assessment and reflective learning
- Design a scope and sequence of research and reporting skills
- Establish preliminary quality indicators

Part III Develop parallel integration plans with specialists
- Monitor and adjust existing units
- Develop additional units
- Initiate the use of Inquiry Boxes
- Involve students in unit and assessment development
- Develop a building wide unit scope and sequence

Identify concepts to be taught independently

Expand the use of authentic assessment

Part IV Integrated day implementation

Polish and refine units - more student involvement

Initiate some thematic cycling

Refine quality indicators

Refine use of authentic assessment practices

Develop and implement the use of demonstration frameworks

(*) continues through all stages

Developed by Pam Conway, Mill Creek Elementary, Columbia, MO

Integrating Academic and Vocational Education

Vocational Education and Academic Education Stages of integration within cooperative efforts, curriculum, and instructional strategies

Cooperative Efforts

Stage 1: Teachers must learn about one another.

Stage 2: Teachers become involved in instructing one another about basic academic skills as used in vocational settings and as taught in academic settings. This stage will evolve into teacher planning and sharing of information.

Stage 3: Teachers move to assist one another in instruction, dovetailing instruction and coordinating scheduling of instruction.

Curriculum Stages

Stage 1: Teachers plan coordinated assignments, projects and instructional sequences.

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Stage 2: Changing from past teaching patterns to more integrated efforts.

Stage 3. Teachers design and prepare projects involving coordinated and collaborative instruction. This stage includes involving community business and industry.

Instructional Strategies

Stage 1: In day-to-day instructional routine of classes, teachers discover instances where they can integrate.

Stage 2: Teachers move to teaching cooperatively, including: assignments, grading, common content and common teaching strategies. Move to a team-teaching approach.

Stage 3: Enhance advanced integration efforts by using people and resources in the community.

Administrative Practices and Procedures

Stage 1: Provide team building and support activities to make teachers feel comfortable. Openly address teacher concerns.

Stage 2: Administrators move to help teachers understand administrative constraints and gain teacher support. Effectively facilitate scheduling and class organization.

Stage 3: Teachers feeling confident of administrative support and feeling they are involved in the integrating process.

Source: Schmidt, B., et al. (1992). *Teachers' roles in the integration of vocational and academic education*. National Center for Research in Vocational Education, Berkeley, CA.

Integrating the Entire School or District

If you are attempting to develop integrated academics in a school district or entire school, this might be the model for you. It is detailed and involves a sixteen step-by-step process. You may want to use all or just pieces of this detailed process.

I. Choose a coordinator

The coordinator will be responsible for organizing, marketing and soliciting participation of teachers. A position of this magnitude requires a fair amount of dedicated planning and organization. This position should be assigned to an administrator or teacher on assignment. It is important that the coordinator is a leader and advocate of change (pioneer of change).

II. Select an advisory committee

The success of any change or project is contingent upon a high level of involvement and commitment of the entire educational community. Therefore, the advisory committee should consist of administrators, teachers, parents and business/industry leaders. A diverse committee will provide a variety of ideas and input from various points of view. It is important to include a representative base of your community and include minorities and a balance of both genders. Encouraging the advisory committee to take an active role in the integration project will help to strengthen this important educational change. Suggested individuals for the advisory committee:

Superintendent/Assistant Superintendent

Principal or vice-principal

The Vocational director

Counselor

Academic teacher

Curriculum Specialist

Vocational teacher

Parents

School board member

Student

Business/industry representatives (3)

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III. **Select courses or content areas to be integrated**

The advisory committee should meet to discuss the educational needs and trends for jobs of the future and how the local educational program is preparing students for their future. School issues such as test scores, failure rates, dropout rates, absentee rates, etc., should be discussed. Through these discussions the committee should be able to come to a consensus about areas of the curriculum where courses can be integrated to fit the needs and the problems of the school and community.

IV. **Select teachers/administrators to become involved**

Voluntary participation of committed people is best. Don't force anyone to become involved in the integrated process. The success or failure of integrated teaching relies significantly upon the commitment and dedication of the teachers.

V. **Have an advisory committee and teachers meeting to establish goals and individual roles.**

Successful integration relies on effective communication with business and industry. This meeting will allow teachers and business/industry persons to collaborate about the outcomes of integrating academics. Business/industry persons can communicate with teachers about academic and social skills needed by young people as future employees.

VI. **Staff development**

Hold staff development for all participating teachers and administrators. Staff development is the means for change in the school.

The need for restructuring, OBE, team building, TQM, learning styles, etc.

VII. **Select an integration model**

Since no two schools are alike, no one model of integration is suitable for all schools. The school must select a model that fits its uniqueness of situation, community, and composition. *See Section I-C for integrated teaching matrix to find the model that will best fit your needs.* You may want to use bits and pieces of each model (cell}) or construct a model of your own. The

model must be something the teachers feel comfortable using and that will fit the needs of your unique educational system.

VIII. Select instructional model

Integrated activities may be delivered within existing courses by making innovative curriculum and scheduling arrangements:

- One-on-one communication and cooperation between an academic and vocational/technology teacher. (i.e. science "hands-on" activities incorporated into vocational curriculum to show practical applications of the academic concepts).
- All or part of the staff to deliver with some aspect of a theme or topic for a brief period of time. (i.e. cultural heritage, ecology, political awareness, etc., a theme to be selected for each month, quarter, year, etc.)
- Teachers of different subjects correlate teaching methods, terminology, and subject matter and assigned to a group of students. (i.e. organize instruction around a series of themes such as self-esteem, change, or cultural heritage, etc.)
- Arrange a two-to-four-hour block of time for teachers to teach two or more subjects cooperatively.

(i.e. teach biology, math and agriculture during a two-hour block. Teachers must agree about scheduling and curriculum arrangements).

- Structure an entire school system to be arranged into career pathways. (i.e. career clusters are determined with all students choosing a career cluster. All academic courses within that cluster are taught with terminology and applications relevant to the chosen cluster).

Form new groupings of content to deliver integrated instruction. Identify appropriate content and designate teacners to plan and deliver the content.

IX. Select students/criteria for the courses/program

Successful employees must work cooperatively with fellow employees. Therefore, cooperative learning and integrating academics prepares students to become successful employees. A successful integrated course should have open entry and homogeneous grouping. Basic classes and accelerated classes do not exist in a truly integrated school. Cooperative learning, hands-on applications, and careful monitoring by the teacher is the goal of an integrated classroom.

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X. Establish scheduling/time frame arrangements

Scheduling arrangements will depend upon the individual school and what integration model is selected. *See Section III A-2 for different configurations of schedules that can be incorporated in an integrated school.* Block scheduling has proven successful for integrated teaching because it allows time for activities and projects.

XI. Establish the role for career development/guidance

Based upon information from the SCANS Report, employee skills are needed for success in the 21st Century. Career guidance counseling is important to the success of the integration process.

XII. Determine roles and activities for insuring support and involvement from all participants

Successful restructuring requires "buy in" from the community. To insure support, include business/industry leaders in helping to develop the integration process. To avoid overlapping of activities allows participants (teachers) time to plan and strategize integrated units. Participants must meet and discuss their roles and designate assignments and activities to be carried out. Involvement and interaction are keys to successful integration.

XIII. Determine evaluation/assessment procedures

The ultimate goal of educational reform and integrated teaching is student achievement. *See the Assessment Sections IV A and IV C for ideas on measuring student achievement and program assessment.* A complete and accurate evaluation can only be made after the integration program has been actively implemented for three-to-five years.

XIV. Determine expansion of integration concepts for the future

After successful implementation of an integrated program, it is important to continue by expanding the concept. Expansion may be extended to other disciplines, grade levels, schools, district level, and even to other districts. A successful program will be easy to sell as student, faculty, and community enthusiasm is contagious. The news media is an effective source of expansion. Start a public relations program and involve the media in spreading the success.

XV. Determine funding sources for restructuring

The largest funding item for integrating academics will be staff development. Training will take one-to-three years. After the bulk of staff training is completed, the major expense is over. A variety of sources exist for funding the integrated approach. Carl Perkins money is available for staff development in articulated plans for integration. Large corporations and many businesses are realizing their money may be used more effectively in public schools than basic skills training of employees.

XVI. Write a three-year integration plan

After all the planning has been done, it's important to document the process. Modifications and adjustments may be necessary in the integrated process. As mentioned throughout this document, since no two schools are alike, trial and error is important to the success of integrated teaching.

Some ideas adapted from: *Blueprint for integration of academic and vocational education*. Educational Development & Training Center. East Texas State University. Commerce, TX 75429.

As you can see, there are many different ways of developing integrated units of instruction and lessons within a district, school, discipline, or across disciplines. Just as the captain of a ship develops a plan before sailing out to sea, we must set our goals and plan our course before setting out to integrate the curriculum for student achievement and success.

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